Radiance Data Assimilation for WRF model: Overview and Results

Radiance Assimilation Status

- Data Ingestion
  - NCEP radiance BUFR data, including AMSU-A/B, MHS,HIRS, AIRS
  - SSMIS from AFWA/NRL, UPP produced
- Radiative Transfer Model
  - Both CRTM 1.1 and RTTOV 7 are incorporated into WRF-Var
- Bias Correction
  - Scan bias and air-mass bias (Harris and Kelly, 2001)
  - Variational Bias Correction (Derber and Wu, 1998)
- Quality Control:
  - AMSU, MHS, SSMIS: Scatter Index and Background CLWP for precipitation check
  - AIRS: Multivariate Minimum Residual (MMR) scheme for cloud detection
- Thinning
  - Pick one pixel closest to the center of the box for AMSU, MHS, SSMIS
  - Pick the warmest pixel for AIRS
- Load Balancing (only for RTTOV currently)
- Observation error tuning (Destroziers & Ivanov, 2001)
- Monitoring tool: useful for research and operational implementation
- Work for 3DVAR/GAT/4DVAR
- Initial Cloudy Radiance Assimilation Capability with CRTM
- CRTM Forward, TL and AD modules for cloudy radiance implemented in WRF-Var.

DATC Extended Testbeds

DATC: Data Assimilation Testbed centers, extended tests for pre-operational implementation

Testbeds: East Asia, Atlantic, Antarctic etc., full cycling experiments for radiance impact evaluation

Future Plans

- Add more instruments, IASI, GOES platforms etc.
- Tune the system for various testbeds
- Further developments for cloudy radiance assimilation and 4DVAR+radiance
- Explore ensemble-based radiance assimilation

Reference
